REMARKS

Applicants acknowledge receipt of Examiner's Office Action dated August 1, 2005. The Office Action rejected all pending claims. Specifically, the Office Action rejected claims 10 and 13 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. The Office Action rejected claims 1-5, 7-11, 13, and 15 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent US2003/0145270 which names Kenneth W. Holt ("Holt") as Applicant. Additionally, claims 1-5, 7-11, and 13-15 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Application US2003/0167439 which names Nisha D. Talagala et al. ("Talagala") as applicants. In light of the foregoing amendments and following remarks, Applicants respectfully request the Examiner's reconsideration and reexamination of all pending claims.

Claims 10 and 13, as noted above, were rejected under 35 U.S.C. § 112, second paragraph. Specifically, the Office Action identifies limitations which lack antecedent basis. Applicants apologize for the typographical errors which created any confusion during examination of the claims. Claims 10 and 13 have been amended to overcome the 35 U.S.C. § 112, second paragraph rejections. Applicants assert the amendments to claims 10 and 13 correct obvious typographical errors and are not intended to limit these claims.

Claims 1-5, 7-11, 13 and 15 stand rejected under 35 U.S.C. § 102 (e) as being anticipated by Holt. Claim 1 recites:

> 1. In a RAID data storage system comprising a stripe, wherein the stripe comprises stripe units $B_1 - B_{max}$, a method comprising:
> receiving a request to read data from stripe unit B_x, wherein B_x is one of stripe units $B_1 - B_{max}$, wherein the request is received from a computer system in data communication with the RAID data storage system;
> reading stripe parity P corresponding to stripe units $B_1 - B_{max}$ in response to receiving the request;
> generating new stripe parity P_{new} corresponding to stripe units $B_1 - B_{max}$ as a function of data of each of the stripe units $B_1 - B_{max}$;
> comparing the new stripe parity P_{new} with the stripe parity P.

In rejecting claim 1, the Office Action argues the CRC information disclosed in Holt is a form of parity bits. Applicants assert that Holt makes a clear distinction between CRC information and parity data. To illustrate, paragraph 0032 recites:

> [0032] RAID storage subsystems utilize a disk array controller that automates managing the redundant array, making operation transparent to the user. The controller makes the system appear to the host computer as a single, highly reliable, high capacity disk drive. In reality, the RAID controller distributes <u>data</u> across multiple small independent drives with <u>redundancy</u> and <u>error checking</u> information to improve reliability.

In the foregoing, Holt describes the use of three different types of data within a RAID storage subsystem. Specifically, this paragraph indicates Holt's RAID storage subsystem stores data, redundancy information, and error checking information. Holt, paragraph 0033 recites as follows:

> [0033] There are several redundancy levels associated with RAID. Certain RAID levels segment the data into portions for storage across several data disks. RAID levels 2-5 utilize XOR parity to provide requisite redundancy. One of more additional disks are utilized to store error check or parity information. The data may be stored as a stripe of data areas distributed across several disks. Striping improves overall performance by using concurrency to reduce the wait time involved in larger I/O operations in that several drives simultaneously process an I/O request. RAID level 5 uses striping as part of internal management functions.

The foregoing paragraph makes clear that Holt employs XOR parity to provide the requisite redundancy information. Holt also describes that one or more additional disks are used to store error check or parity information. As such, Holt makes a clear distinction between error check information (e.g., CRC) and parity information. Thus, Applicants assert that it is improper to argue that paragraph 0036, lines 7-9 of Holt shows that CRC information is a form of parity bits as set forth in the Office Action.

The Office Action asserts that paragraph 0038 of Holt teaches generating new stripe parity P_{new} corresponding to stripe units B_1 - B_{max} as a function of data of each of the stripe units B_1 - B_{max}. Moreover, the Office Action asserts that paragraph 38 of Holt compares the new stripe parity P_{new} with the stripe parity P. Applicants have reviewed paragraph 38. Paragraph 38 of Holt sets forth:

> [0038] The CRC information that is stored on the drives may be used to verify data path integrity at a byte level on subsequent read operations. By storing the CRC information on a drive separate from the associated data

> block, this invention allows the CRC to be used to detect drive anomalies at a byte level, as well. On read operations, both the data block and the associated CRC information may be read from their respective drives. <u>CRC may be generated for the data read from disk and compared against the CRC that was stored as metadata</u>. If the check fails, data may be extracted from the parity drive via normal reconstruction techniques. CRC for the reconstructed data may be generated and compared against the CRC stored as metadata. If the CRC for the reconstructed data matches the CRC stored as metadata, then it can safely be assumed that the data drive is in error. If the CRC for the reconstructed data does not match the CRC stored as metadata, then it can reasonably be assumed that the CRC drive is in error. In this case, the reconstructed data may be compared against the original data as an additional data integrity check.

Paragraph 38 fails to teach or fairly suggest generating new stripe parity P_{new} corresponding to stripe units $B_1 - B_{max}$. Claim 1 clearly recites that new stripe parity P_{new} is generated as a function of data of <u>each</u> of the stripe units $B_1 - B_{max}$. Assuming that the CRC information disclosed in Holt is the same as parity data in independent claim 1, Holt fails to teach or fairly suggest generating new stripe parity as a function of data of <u>each</u> of the stripe units $B_1 - B_{max}$. Rather, Holt teaches generation of CRC information as a function of data within one data block of a stripe, not all data blocks of a stripe. To illustrate, paragraph 0038 of Holt indicates that "CRC may be generated for the data read from disk and compared against the CRC that was stored as metadata." Paragraph 0041 of Holt describes that RAID 5 data is striped at a block level across multiple parallel data disks. As such, the cited section of Holt fails to teach or fairly suggest generating new stripe parity P_{new} as a function of data of <u>each</u> of the stripe units B_1 –

B_{max} as set forth in independent claim 1 either alone or in combination with the remaining limitations of independent claim 1.

The Office Action also asserts that claim 1 is taught by Talagala. In rejecting claim 1, the Office Action asserts that paragraph 0037 of Talagala teaches the act of reading all check sums relating to a stripe. The Office Action equates the act of reading all check sums as equivalent to the act of reading stripe parity P as set forth in independent claim 1. Applicants assert it is improper to make this comparison. One reason is the clear distinction between check sum and parity made in the claims of the instant application (e.g., claim 5, which depends from claim 1, recites: if stripe parity P does not compare equally to new stripe parity P_{new}, reading checksum CS data from memory, wherein the checksum CS data corresponds to stripe units $B_1 - B_{max}$). Moreover, Talagala makes a distinction between check sum and parity data. See, e.g., paragraph 4, lines 4-6 which states, "the parity information is additional information stored on the disks which can be used to reconstruct data contained on any of the disk drives in the array in the event of a single disk drive failure, " and paragraph 21, lines 3 and 4 which states, "an additional block, referred to as a parity block, is calculated based on the values of the other blocks and is written to a separate disk drive." As such, the cited sections of Talagala fails to teach or fairly suggest reading stripe parity P either alone or in combination with the remaining limitations of independent claim 1. Accordingly, independent claim 1 is patentably distinguishable over Talagala.

Claims 2-6 depend from independent claim 1. Insofar as independent claim 1 has been shown to be patentably distinguishable over Holt and Talagala, it follows that claims 2-6 are likewise patentably distinguishable.

Independent claim 7 was rejected under 35 U.S.C. § 102 (e) as being anticipated by Holt and Talagala. Independent claim 7 was rejected for the same reasons that claim 1 was rejected. Applicants refer to the arguments above made with respect to claim 1 and assert that claim 7 is patentably distinguishable over Holt and Talagala for the same or similar reasons.

Claims 8-12 depend from independent claim 7. Insofar as independent claim 7 has been shown to be patentably distinguishable, it follows that dependent claims 8-12 are likewise patentably distinguishable.

Independent claim 13 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Holt and Talagala. Independent claim 13 was rejected for the same or similar reasons that independent claim 1 was rejected as being anticipated by Holt and Talagala. Applicants assert that independent claim 13 is patentably distinguishable over Holt and Talagala for the same reasons or similar reasons that independent claim 1 was shown to be patentably distinguishable.

CONCLUSION

Applicant submit that all claims are now in condition for allowance, and an early notice to that effect is earnestly solicited. Nonetheless, should any issues remain that might be subject to resolution through a telephonic interview, the Examiner is requested to telephone the undersigned.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P. O. Box 1450, Alexandria, Virginia, 22313-1450, on 10/31/05.

Attorney for Applicant(s) — Date of Signature 10/31/05

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